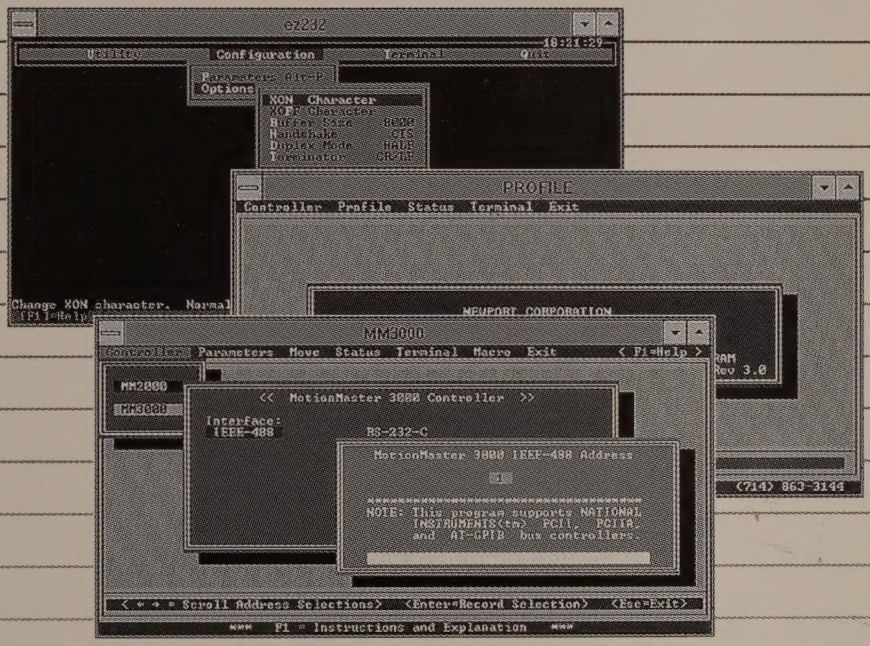
MM3000 Software Utilities



USER'S MANUAL

Newport

Warranty

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Warranty

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Table of Contents

Warranty ii

Table of Contents iii

Section 1 — Introduction

1.1 Purpose and Scope of Utilities 1.1

START UP 1.1

PROFILE 1.1

EZ232 ..... 1.1

1.2 Distribution Diskette Directories and Files 1.2

Root Directory 1.2

"EZ232" Directory 1.2

"PROFILE" Directory 1.3

"STARTUP" Directory 1.3

Section 2 — MotionMaster3000 Start Up Utility

2.1 Start Up Introduction 2.1

2.2 Start Up Installation and Setup 2.1

2.3 Start Up Program Demonstration 2.2

Introductory Screen 2.2

Help Screen 2.2

Controller Selection Screen 2.3

IEEE 488 Addressing Screen 2.3

RS-232 Baud Rate Setup Screen 2.4

System Configuration Screen 2.4

Parameters Menu Screen 2.5

Parameters Axis [n] Screen 2.5

Move Menu Screen 2.6

Move Menu Axis [n] Screen 2.6

Move Sequence Screen 2.7

Move Jog Screen 2.7

Status Menu Screen 2.8

Position Status Screen 2.8

Status Move Screen 2.9

Status Parameter Screen 1 ..... 2.9

Status Parameter Screen 2 ..... 2.10

Terminal Menu Screen 2.10

Terminal Menu Keyboard Screen 2.11

Pop up Error Message Screen 2.11

Terminal Menu File Screen 2.12

Macro Menu Origin Search Screen 2.12

Exit Menu Screen 2.13

Section 3 — MotionMaster3000 Profile Utility

3.1 Profile Introduction 3.1
3.2 Profile Installation and Setup 3.1
3.3 Profile Program Demonstration 3.2
Introductory Screen 3.2
Controller Selection Screen 3.2
IEEE 488 Address Setup Screen 3.3
RS-232 Baud Rate Setup Screen 3.3
System Configuration Screen 3.4
Profile Axis Selection Screen 3.4
Profile Trajectory Setup Screen 3.5
Desired vs. Actual Profile Screen 3.5
Status Menu Screen 3.6
Position Status Screen 3.6
Terminal Menu Screen 3.7
Terminal Keyboard Screen 3.7
Pop Up Error Message Screen 3.8
Terminal File Screen 3.8
Exit Menu Screen 3.9

Section 4 — EZ232 Serial Communications Utility

4.1 EZ232 Introduction 4.1
4.2 EZ232 Installation and Setup 4.1
4.3 EZ232 Program Demonstration 4.2
Introductory Screen 4.2
Utility Screen 4.2
Configuration Menu Screen 4.3
Parameter Setup Screen 4.3
Options Setup Screen 4.4
Terminal Screen 4.4
Help Screen 4.5
Quit Menu Screen 4.5

Section 1
Introduction

1.1 Purpose and Scope of Utilities

The START UP, PROFILE and EZ232 series of utilities are supplied with the MM3000 as an aid to the user in getting up and running. These utilities are tools and are not an integral part of the MM3000, i.e., you do NOT need to run these programs to operate the MM3000.

These utilities are separated into three parts:

START UP

Used to establish IEEE488 or RS-232C communications between the MM3000 and the host computer, modify motion parameters, develop move sequences or monitor position status.

PROFILE

Used to establish IEEE488 or RS-232C communications between the MM3000 and the host computer to optimize PID servo parameters for DC stages.

EZ232

Used to establish RS-232C terminal emulation communications between the MM3000 and the host computer.

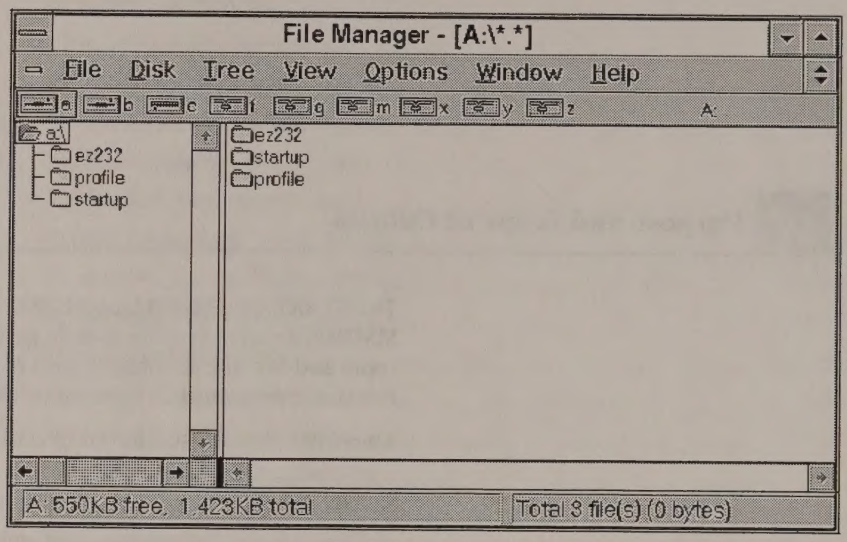
NOTE

To use the MM3000 utilities, you need:

- **A personal computer with a 386SX or higher processor running MS-DOS® operating system version 3.3 or later**
- **800 KB of available hard disk space**
- **One 3.5" high density disk drive**
- **VGA or higher resolution graphics card**

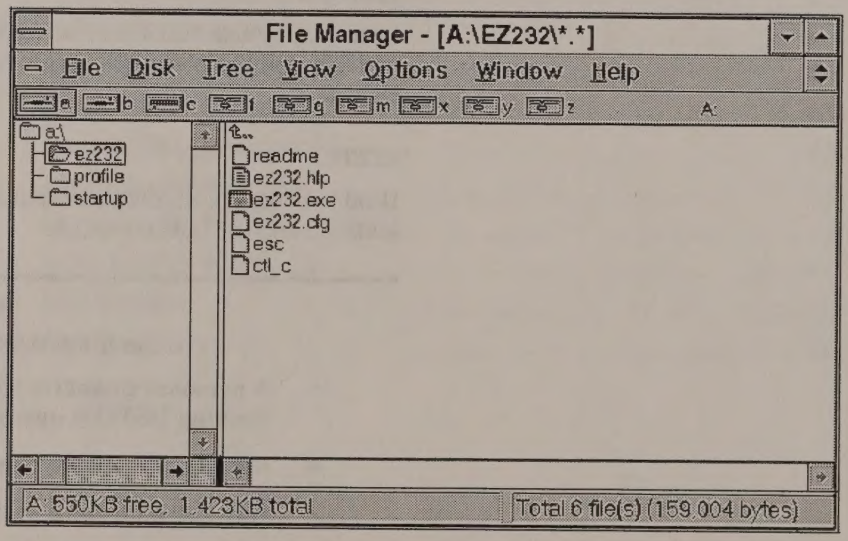
1.2 Distribution Diskette Directories and Files

Root Directory



The MM3000 3.5" distribution diskette contains three(3) directories: STARTUP, PROFILE and EZ232. Each utility has its own dedicated directory.

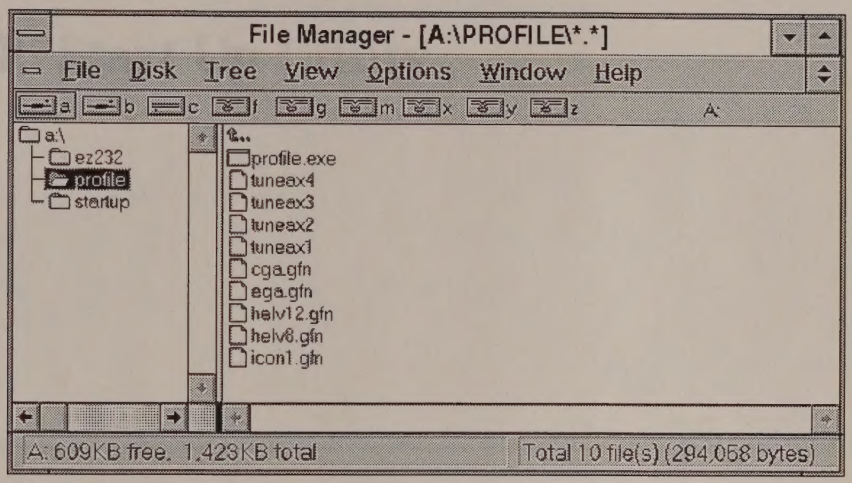
"EZ232" Directory



The EZ232 directory contains all the files necessary to run the MM3000 EZ232 program named EZ232.EXE.

To install the EZ232 utility program, copy all the files from the EZ232 directory (see figure above) over to your hard disk and then run EZ232.EXE.

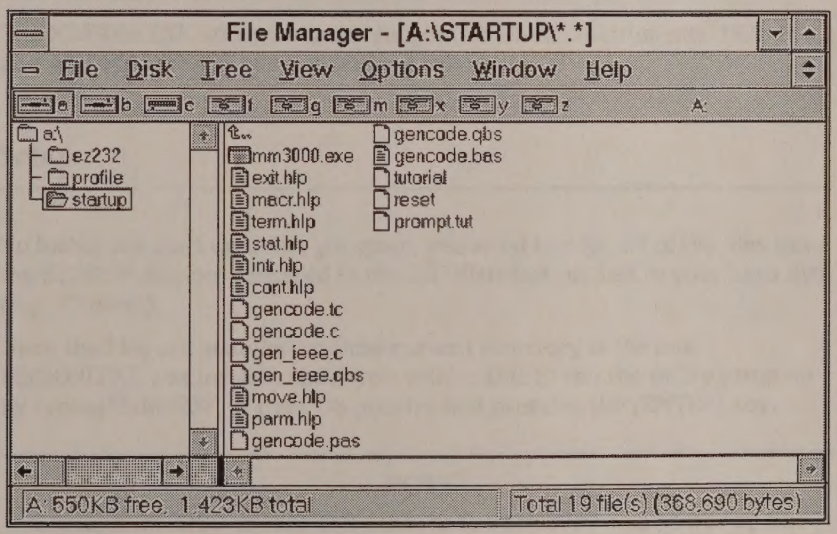
"PROFILE" Directory



The PROFILE directory contains all the files necessary to run the MM3000 Profile program, PROFILE.EXE.

To install the Profile utility program, copy all the files from the PROFILE directory (see figure above) over to your hard disk and then run PROFILE.EXE.

"STARTUP" Directory



The STARTUP directory contains all the files necessary to run the MM3000 StartUp program, MM3000.EXE.

To install the StartUp utility program, copy all the files from the STARTUP directory (see figure above) over to your hard disk and then run MM3000.EXE.

Section 2
MotionMaster3000 Start Up Utility
Version 4.0

2.1 Start Up Introduction

The MM3000 DOS based STARTUP utility, MM3000.EXE, is located in the STARTUP directory of the 3.5" distribution diskette.

This utility will enable you to immediately use and test the MM3000 after you have carefully read through the MM3000 User's Manual and connected all stages.

This utility supports both RS-232C serial and IEEE488 parallel communication interfaces connected to a MM3000 motion controller.

The MM3000.EXE utility program supports National Instruments' PCII, PCIIA and AT-GPIB IEEE488 bus controller cards.

2.2 Start Up Installation and Setup

To install the start up utility program, you need to copy all of the files from the STARUP directory located in the 3.5" distribution disk to your hard disk (e.g., C: drive).

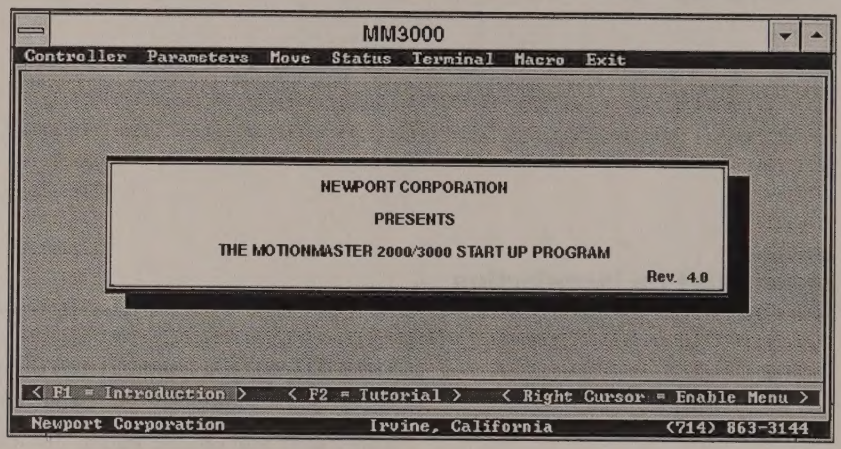
Once the files are installed and the current directory is the one MM3000.EXE was installed into, you will be able to run the utility program by typing "MM3000" at the DOS prompt and pressing the [ENTER] key.

NOTE

Connect RS-232C or IEEE488 cable to the MM3000 and power-up the unit before running this utility program.

2.3 Start Up Program Demonstration

Introductory Screen

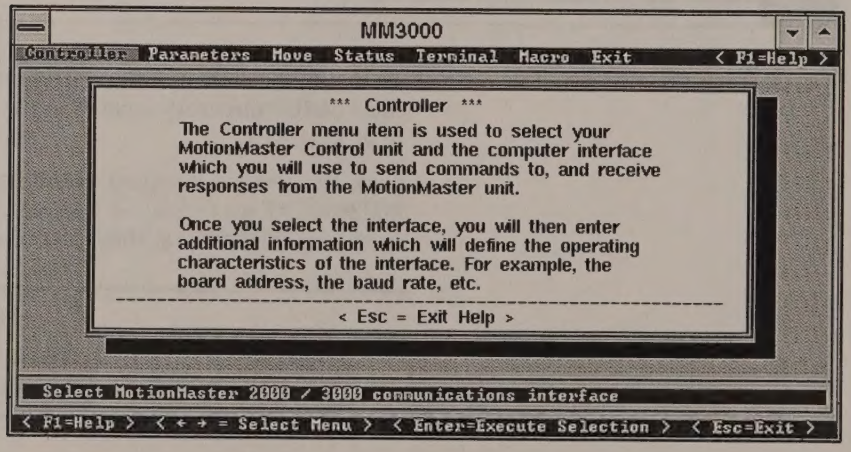


When you first begin the MM3000 STARTUP utility program, the introduction screen appears and indicates the software version.

At this point you can press [F1] and read an introductory message, press [F2] for tutorial, or proceed beyond the introductory screen.

To proceed beyond the introductory screen and enable menu selections, press the right arrow (→) button or cursor key.

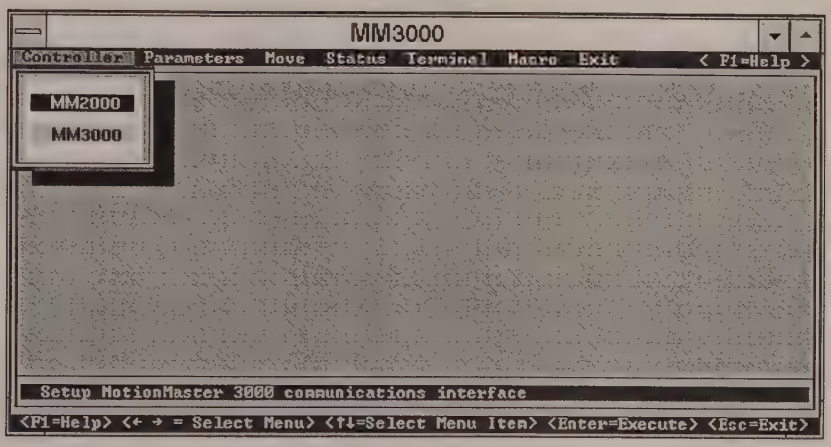
Help Screen



This utility provides context sensitive help screens to assist you throughout various menu levels.

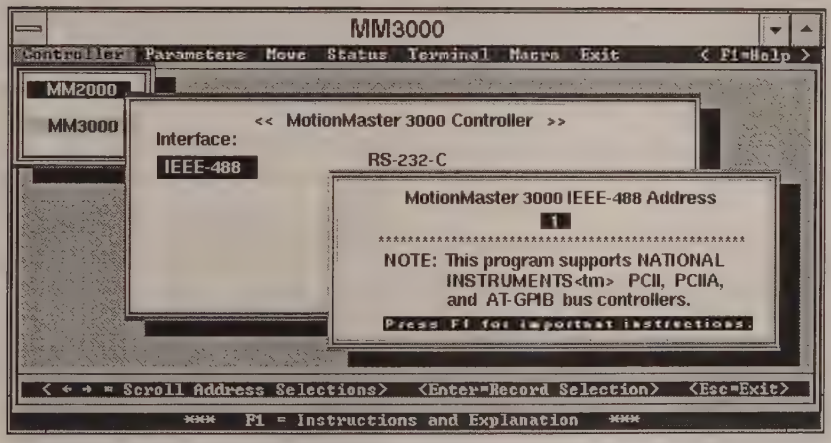
Press the [F1] key at any time for help information or assistance.

Controller Selection Screen



This utility supports both the MM2000 PC based controller and MM3000 stand alone controllers. For the MM3000, select MM3000.

IEEE488 Addressing Screen



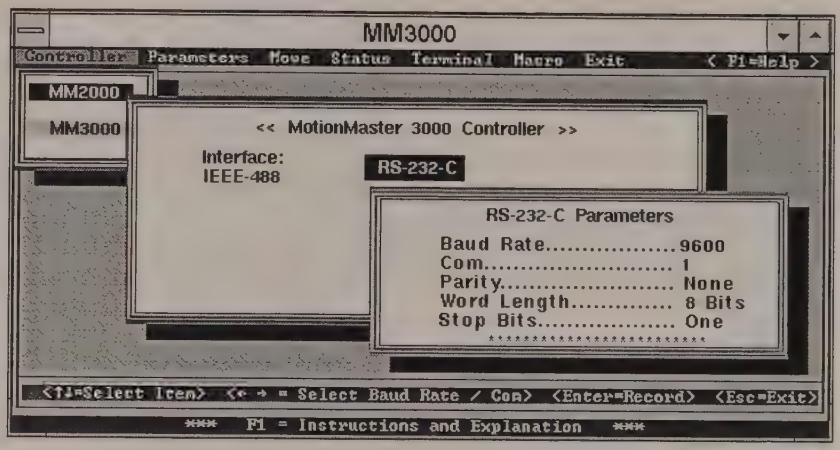
This utility supports National Instruments' IEEE488 (GPIB) PCII, PCIIA and AT-GPIB compatible bus controllers.

Use the left (←) and right (→) arrow keys to select device address. The selections must correspond with the current MM3000 device address setting.

NOTE

The MM3000 is factory set to device address 1.

RS-232C Baud Rate Setup Screen

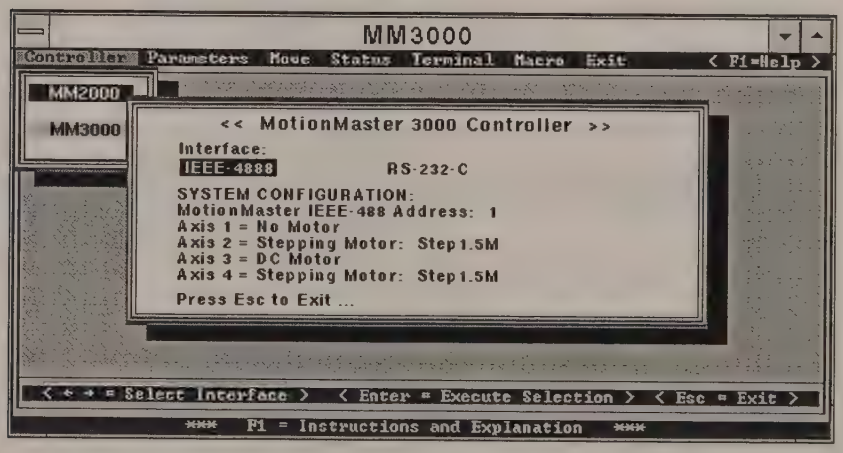


Use the left (←) and right (→) arrow keys to select the baud rate. This setting must correspond with the current MM3000 baud rate setting.

NOTE

The MM3000 defaults to 9600 baud after system reset. (e.g., power on/off)

System Configuration Screen



After you have selected the correct IEEE488 address or RS-232C baud rate, press [ENTER] to: (a) save the configuration to file INTRFACE.INI and, (b) to display the current MM3000 stepping or DC servo module configuration, or assignment.

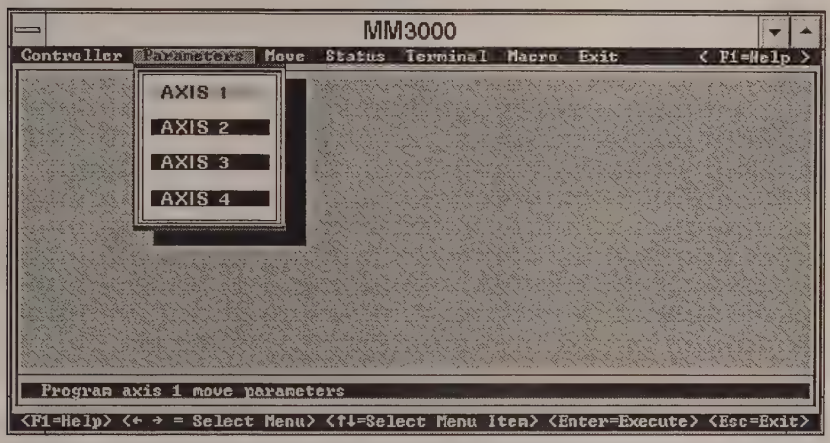
If the RS-232C baud rate or IEEE488 address setting selected does not match the MM3000, or if the MM3000 is OFF or the interface is not connected, the screen will display a "Motor Unkown" message for each axis.

If the setup is correct, this utility will automatically initialize the MM3000 controller (e.g., to generate interrupt on error) when communications has been successfully established.

NOTE

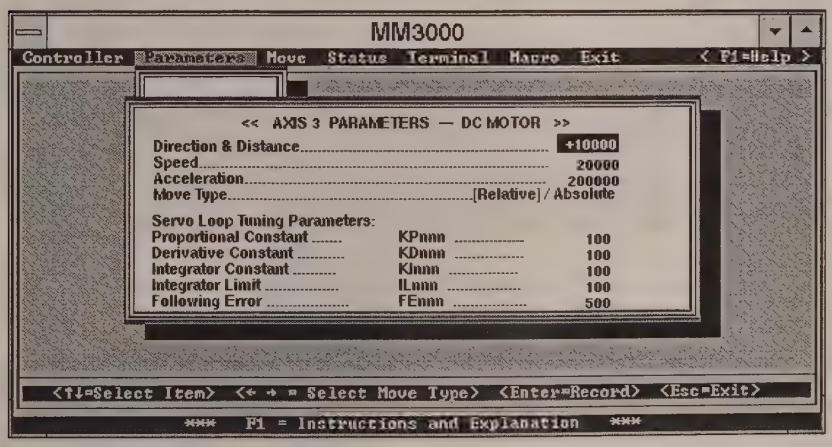
The selected port (RS-232C or IEEE488) and communications parameters (i.e., address or baud rate) are saved to file INTRFACE.INI and are automatically loaded upon entry. Therefore it will not be necessary to go into the CONTROLLER menu each time this utility is started.

Parameters Menu Screen



The next menu item is PARAMETERS. In this menu current MM3000 axes' trajectory and servo (if DC motor) settings can be altered and saved.

Parameters Axis [n] Screen



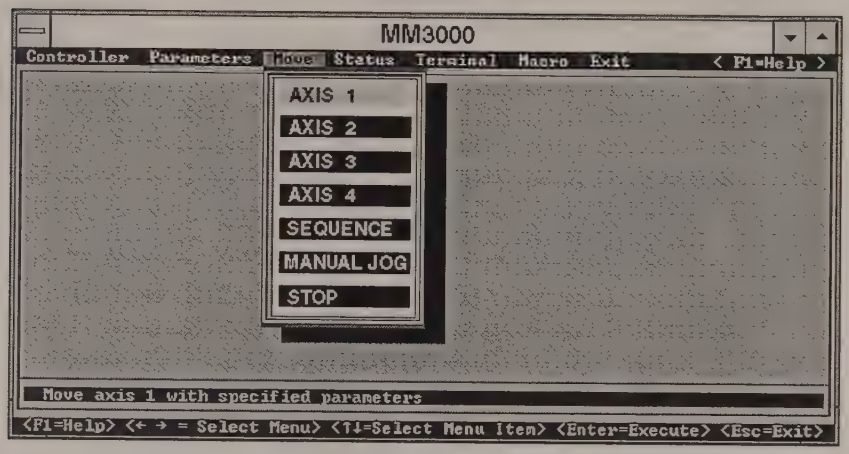
When the [ENTER] key is pressed all changed parameters (except Direction & Distance) are sent to the MM3000, where they are stored in non-volatile memory.

The "Direction & Distance" and "Move Type" settings are used in the MOVE menu.

CAUTION

Do not change PID (KP, KD, KI, IL, FE) unless you have read the MM3000 User's Manual)

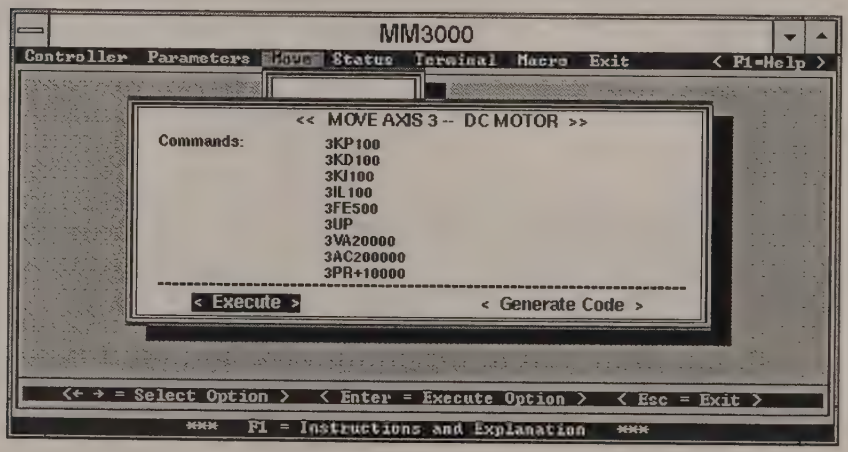
Move Menu Screen



The MOVE menu uses the trajectory settings from the PARAMETERS menu to move any MM3000 installed axis.

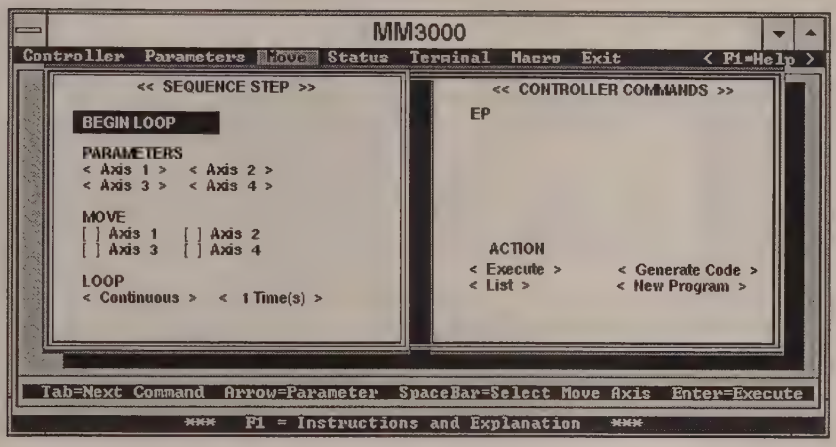
In this menu, the utility can make the MM3000 move one axis at a time, move several axes together, cycle back and forth, or move in jog mode using the keyboard arrow (←↑→↓) or cursor keys.

Move Menu Axis [n] Screen



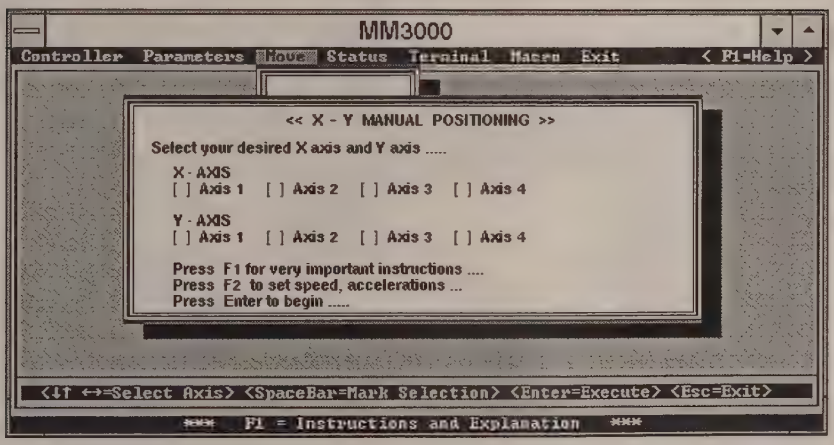
If EXECUTE is selected then the utility sends the PID Servo and trajectory commands to the MM3000 for immediate execution. If GENERATE CODE is chosen then the utility will generate sample QuickBASIC or C source code using these parameters.

Move Sequence Screen



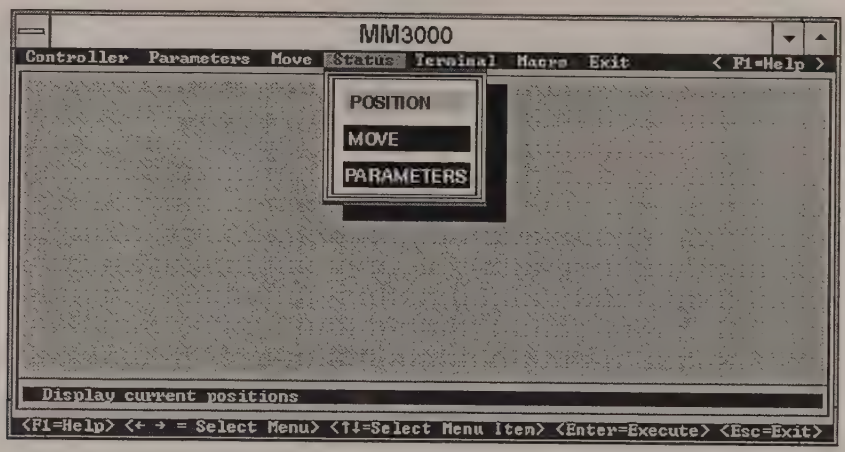
While in the SEQUENCE menu level, you will be able to develop and execute motion sequences using trajectory and PID parameters saved earlier in the PARAMETERS menu.

Move Jog Screen



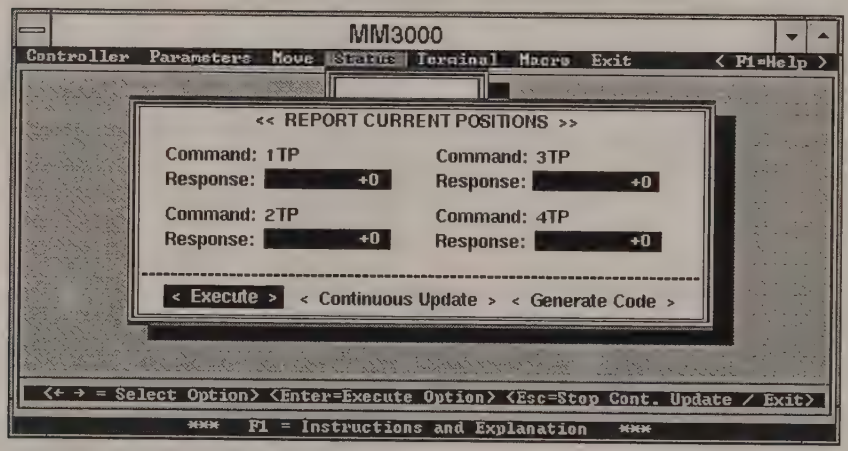
In the JOG menu, axes can conveniently be assigned to the keyboard arrow (←↑→↓) or cursor keys thereby enabling you to "jog" any stages/motors from the host computer terminal.

Status Menu Screen



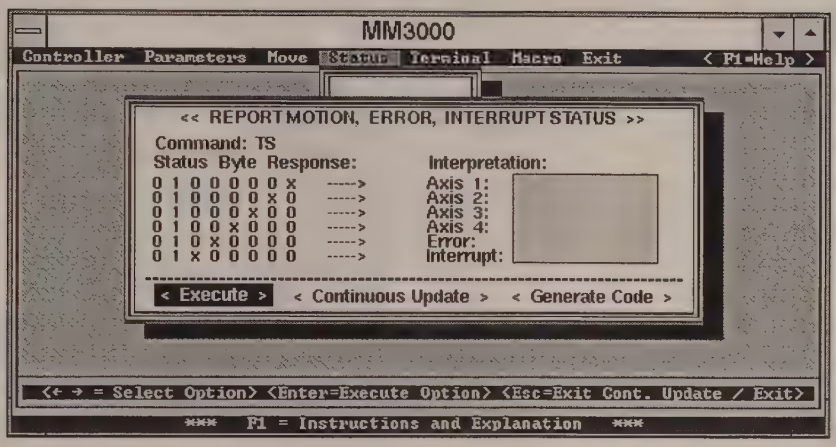
This menu allows you to query current position, moving/not moving, target trajectory and PID status.

Position Status Screen



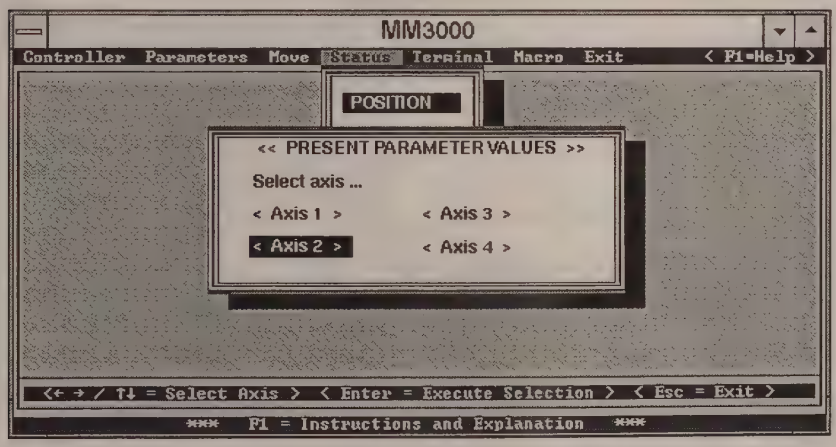
In the POSITION STATUS screen, you will be able to sample the real time position count of all installed axes. The displayed position count can either be sampled once or continuously updated.

Status Move Screen



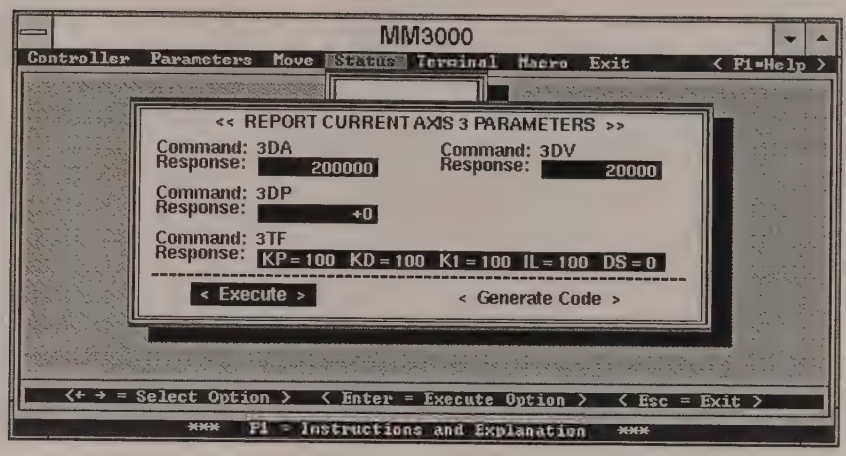
The MOVE screen allows you to observe the motion status as reported by the TS command. For an explanation of the TS command, please read the command section in the MM3000 user's manual. This can be executed once or continuously.

Status Parameter Screen 1



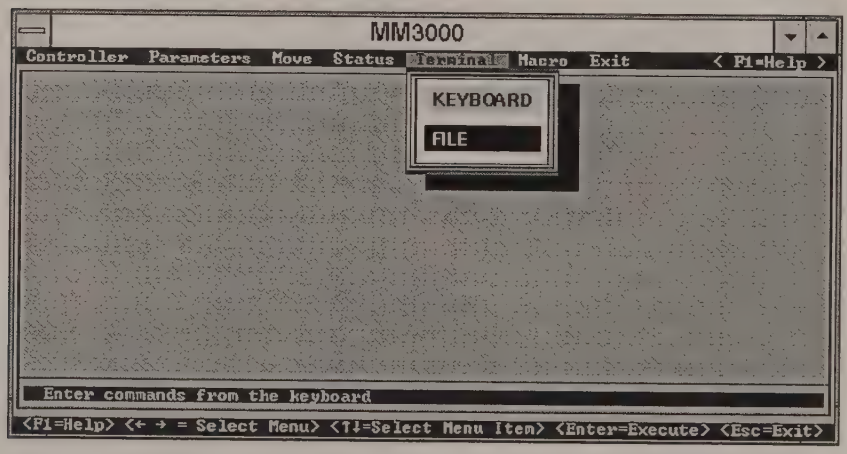
In this screen you can select to view any axis' trajectory and PID servo status information.

Status Parameter Screen 2



By pressing the [ENTER] key while "EXECUTE" is highlighted, you can examine the target velocity, acceleration, and PID servo parameter settings for the selected axis.

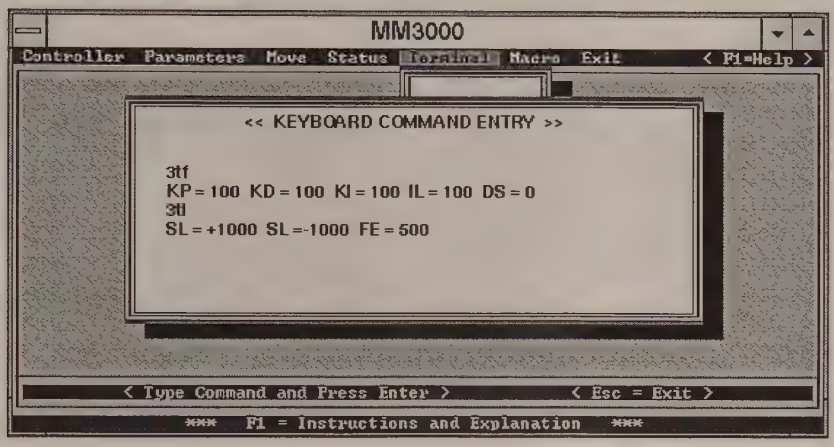
Terminal Menu Screen



The TERMINAL menu will allow you to: (a) interactively send commands to the MM3000 and receive responses and, (b) download text files from the host computer to the MM3000.

It is recommended that you familiarize yourself with the controller's command structure and syntax by reviewing the MM3000's User's Manual before selecting KEYBOARD or FILE menu items.

Terminal Menu Keyboard Screen



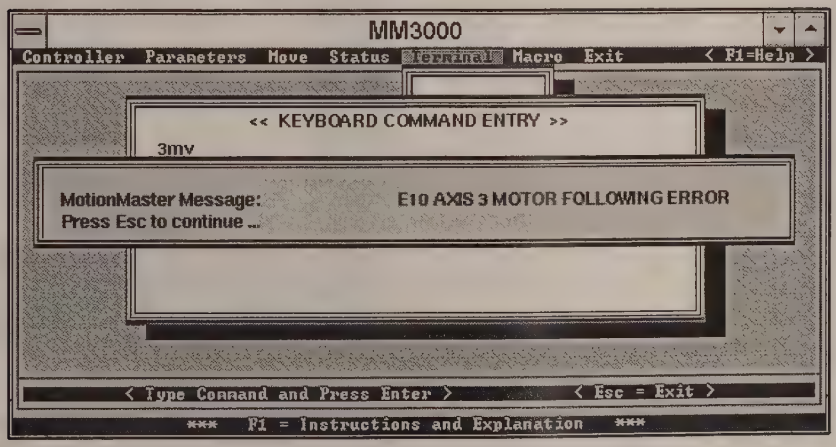
In the KEYBOARD menu, you are allowed to type any MM3000 command and send it to the controller.

This utility tests for out going query commands (e.g., TP, UP?) and automatically knows to retrieve data from the controller.

NOTE

The user should have a thorough understanding of the MM3000 command structure and syntax before using KEYBOARD command terminal.

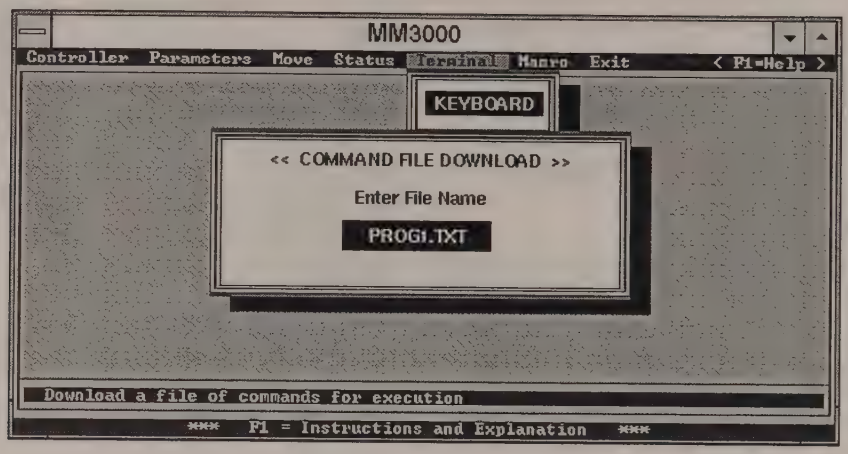
Pop up Error Message Screen



Whenever the utility detects the occurrence of an MM3000 error, a pop-up error message will appear on the screen.

If this occurs, the keyboard [ESC] escape key must be pressed to continue.

Terminal Menu File Screen

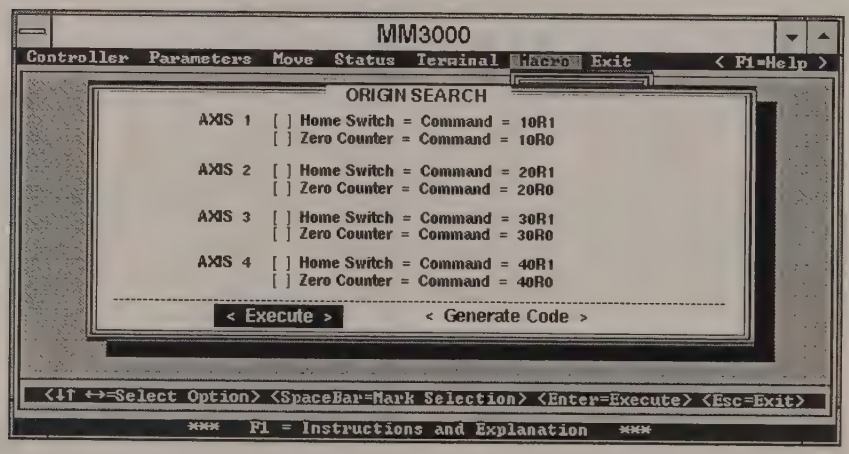


For added convenience, this utility also allows you to download a text file with MM3000 commands from the host computer to the MM3000 controller.

Files should be located in the same directory as the MM3000.EXE program.

Text files with MM3000 commands or programs can be created or edited outside of this utility in any text editor (e.g., MSDOS EDITOR) and downloaded here.

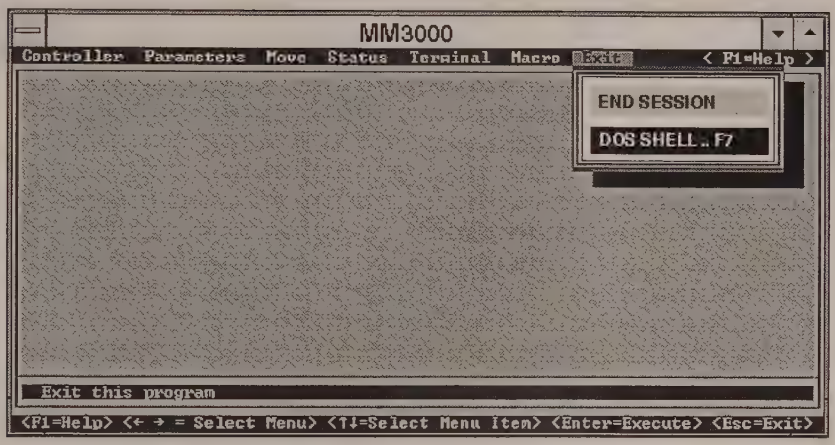
Macro Menu Origin Search Screen



In the ORIGIN SEARCH menu there are two origin, or homing options for each axis. If your stage is equipped with a home switch then select HOME SWITCH option. If your stage does NOT have a home switch, select ZERO COUNTER.

If you are not sure if your stage has a home switch, choose ZERO COUNTER.

Exit Menu Screen



To exit this utility select END SESSION from the EXIT menu.

To invoke a DOS shell select DOS SHELL from the EXIT menu or press [F7].

Many programmers use the DOS shell utility to edit or create MM3000 programs in text files (e.g., edit prog1.txt), re-enter the utility and then download the file from the TERMINAL / FILE menu out to the MM3000.

Section 3
MotionMaster3000 Profile Utility
Version 3.0

3.1 Profile Introduction

This DOS based motion profile utility program, PROFILE.EXE, is located in the PROFILE directory of the 3.5" distribution diskette.

This utility will enable you to optimize PID servo parameters for your specific application requirements after you have carefully read through the MM3000 User's Manual. Note that in most cases it is not necessary to alter PID values from factory or TY command defaults.

Both, RS-232C serial and IEEE488 parallel communication interfaces are supported.

The PROFILE.EXE utility program supports National Instruments' **PCII, PCIIA** and **AT-GPIB** IEEE488 bus controller cards.

3.2 Profile Installation and Setup

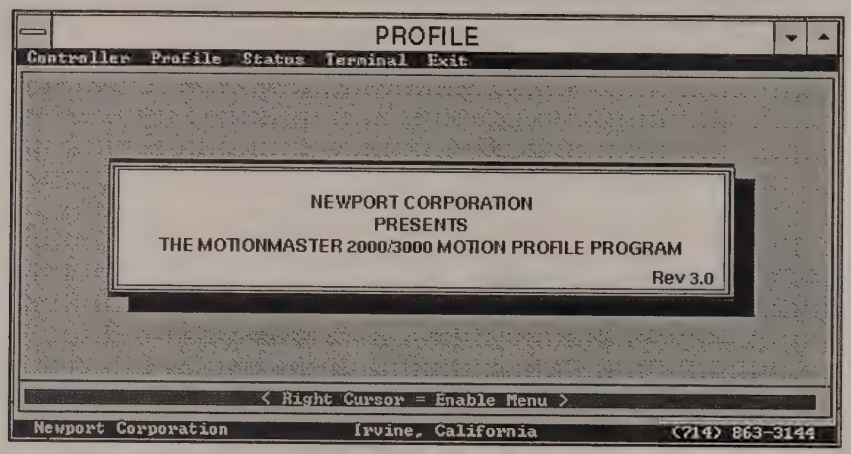
To install the profile utility program, you need to copy all of the files from the PROFILE directory located in the 3.5" distribution disk to your hard disk (e.g., C: drive).

Once the files are installed and the current directory is the one PROFILE.EXE was installed into, you will be able to run the utility program by typing "PROFILE" at the DOS prompt and pressing the [ENTER] key.

NOTE

Connect RS-232C or IEEE488 cable to the MM3000 and power-up the unit before running this utility program.

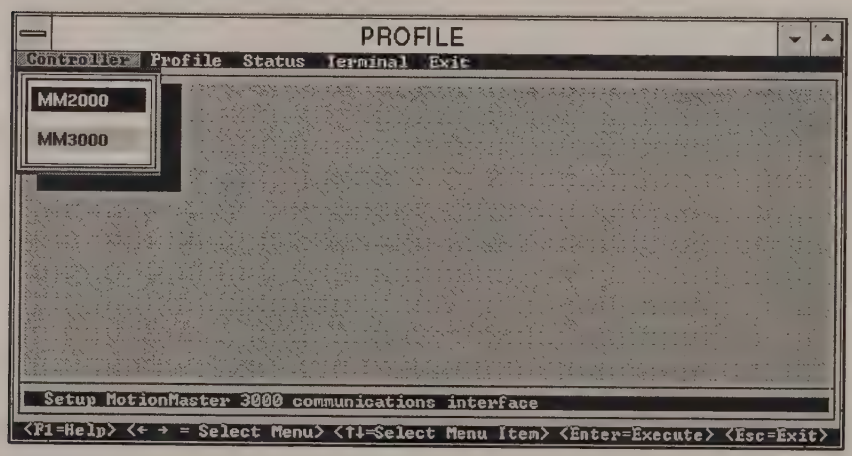
Introductory Screen



When you first begin the MM3000 profile utility program, the introduction screen appears and indicates the software version.

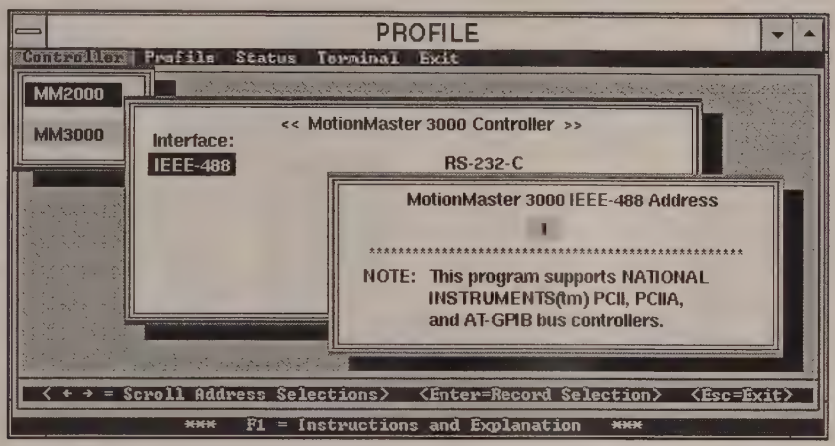
To proceed beyond the introductory screen and enable menu selections, press the right arrow (→) button or cursor key

Controller Selection Screen



This utility supports both the MM2000 PC based controller and MM3000 stand alone controllers. For the MM3000, select MM3000.

IEEE488 Address Setup Screen



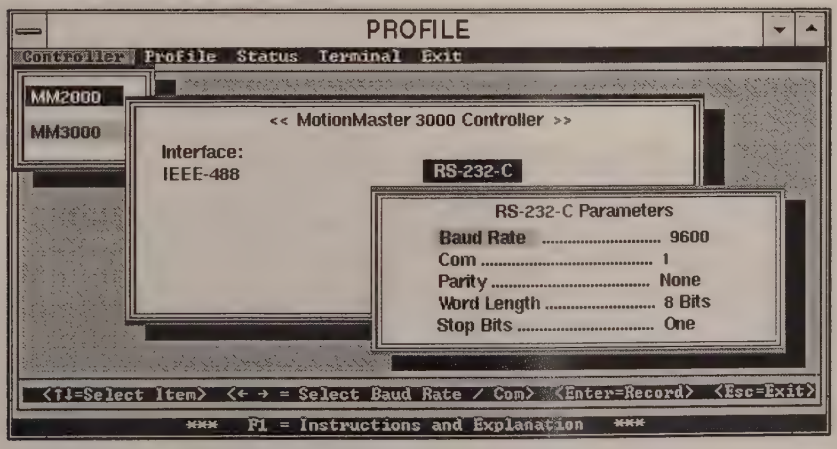
This utility supports National Instruments' IEEE488 (GPIB) PCII, PCIIA and AT-GPIB compatible bus controllers.

Use the left (←) and right (→) arrow keys to select device address. The selections must correspond with the current MM3000 device address setting.

NOTE

The MM3000 is factory set to device address 1.

RS-232C Baud Rate Setup Screen

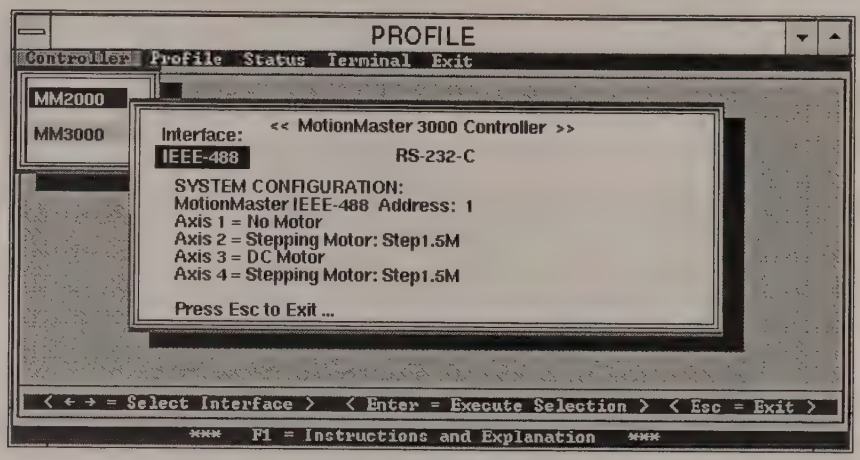


Use the left (←) and right (→) arrow keys to select the baud rate. This setting must correspond with the current MM3000 baud rate setting.

NOTE

The MM3000 defaults to 9600 baud after system reset. (e.g., power on/off)

System Configuration Screen



After you have selected the correct IEEE488 address or RS-232C baud rate, press [ENTER] to: (a) save the configuration to file INTRFACE.INI and, (b) to display the current MM3000 stepping or DC servo module configuration or assignment.

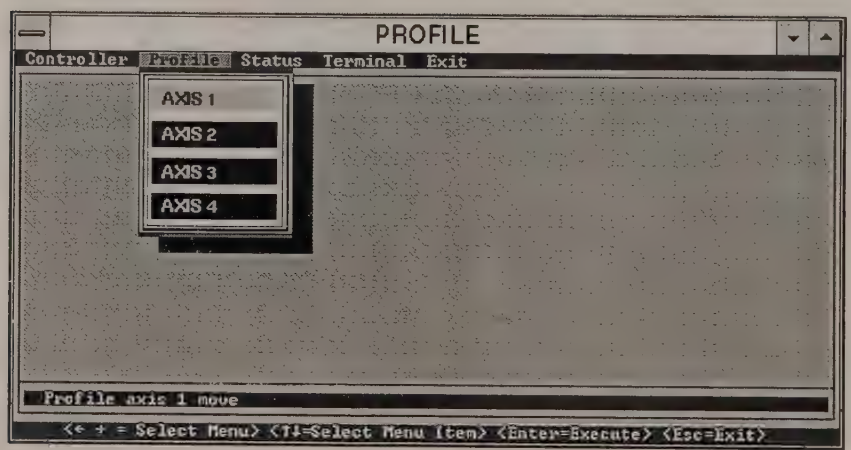
If the baud rate or IEEE488 address setting selected does not match the MM3000 or if the MM3000 is OFF or unconnected, the screen will display a "Motor Unkown" message for each axis.

This utility will automatically initialize the MM3000 controller (e.g., to generate interrupt on error) when communications has been successfully established.

NOTE

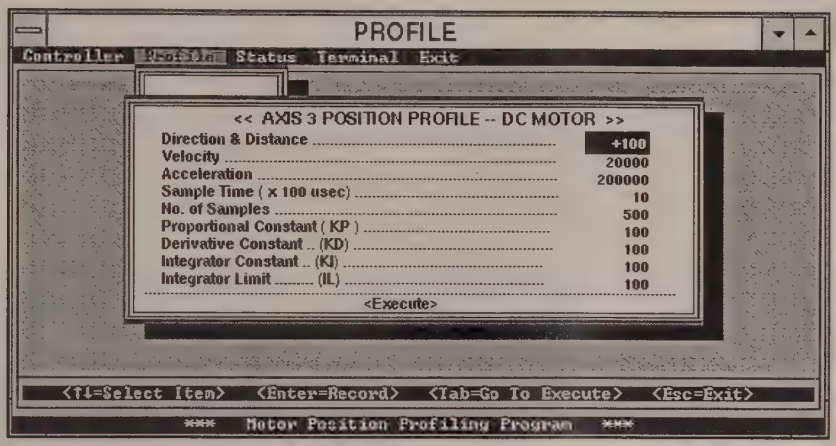
The selected port (RS-232C or IEEE488) and communications parameters (i.e., address or baud rate) are saved to file INTRFACE.INI and are automatically loaded upon entry. Therefore it will not be necessary to go into the CONTROLLER menu each time this utility is started.

Profile Axis Selection Screen



In the PROFILE menu you first must choose the axis to be optimized.

Profile Trajectory Setup Screen

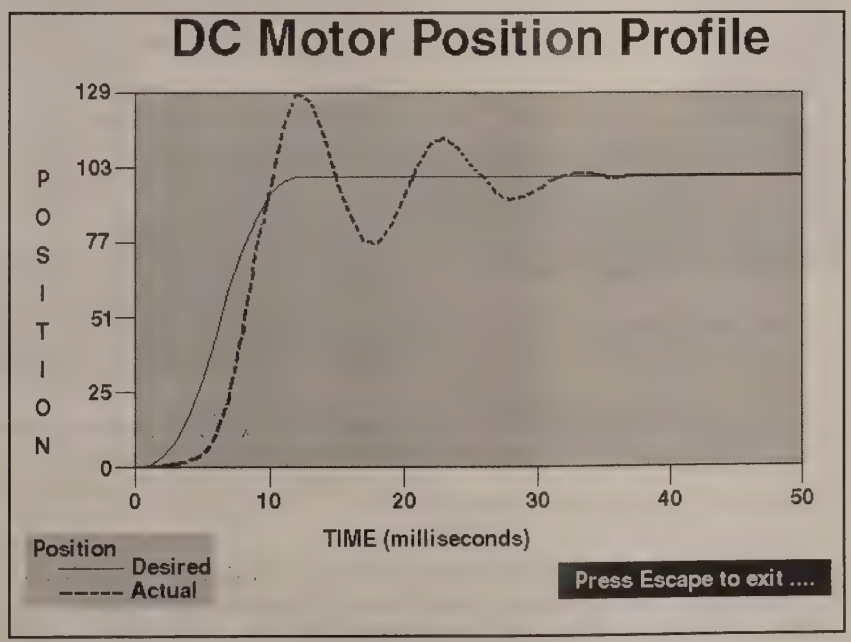


In this screen you can change PID servo and trajectory parameters then press the [TAB] and [ENTER] keys to begin profiling. In just a few seconds the utility will the present the "ideal versus real" trajectory in graphical form for comparison. To reduce the time it takes to display all the data in graphical form, adjust the "No. of samples" value to the smallest possible number that will still show the entire motion (e.g., No. of Samples = 50)

NOTE

PID servo and trajectory values are automatically saved in the controller's non-volatile memory.

Desired vs. Actual Profile Screen

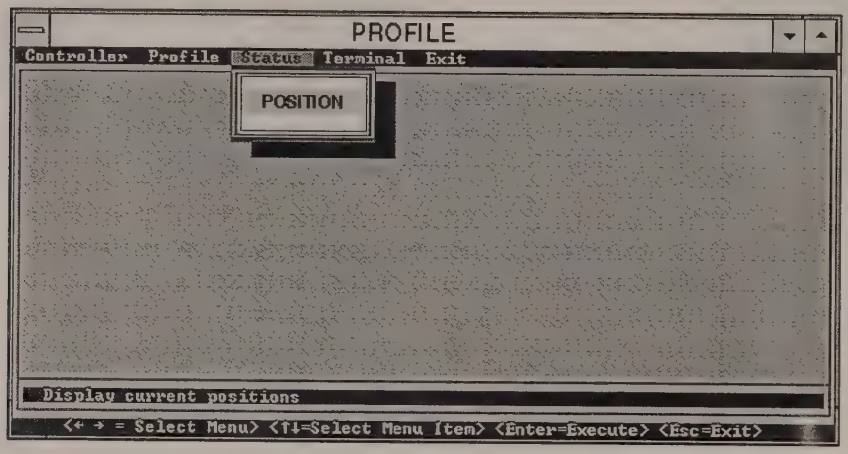


In the PROFILE screen we can graphically observe a DC stage's dynamic positioning performance for a given PID servo (i.e., KP, KD, KI, IL) and trajectory (i.e., PR, VA, AC) setting.

For example, on the previous page we observe that this stage: (1) could not initially follow the desired, or target, acceleration (possibly generating a "Following Error"), (2) overshot the target (i.e., 100 counts) by about 30% and (3) finally settled in about 40 milliseconds instead of the desired 10 milliseconds.

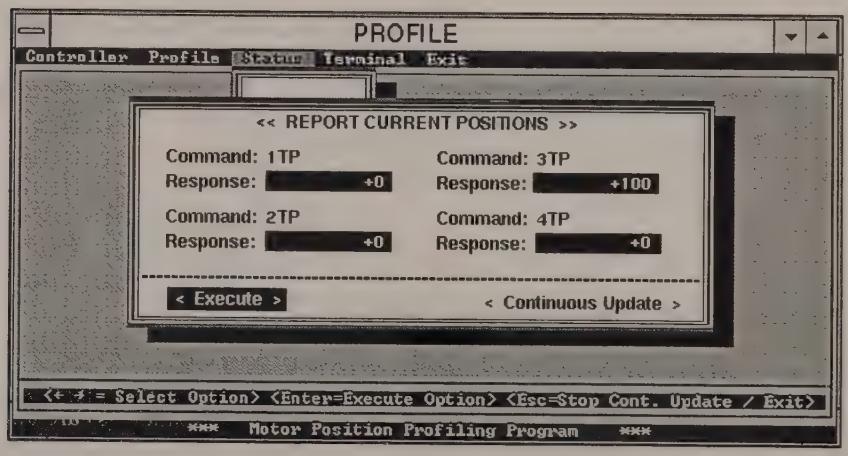
Pressing the keyboard [ESC] escape key will return you the previous screen where PID servo and trajectory can be adjusted for optimal stage performance.

Status Menu Screen



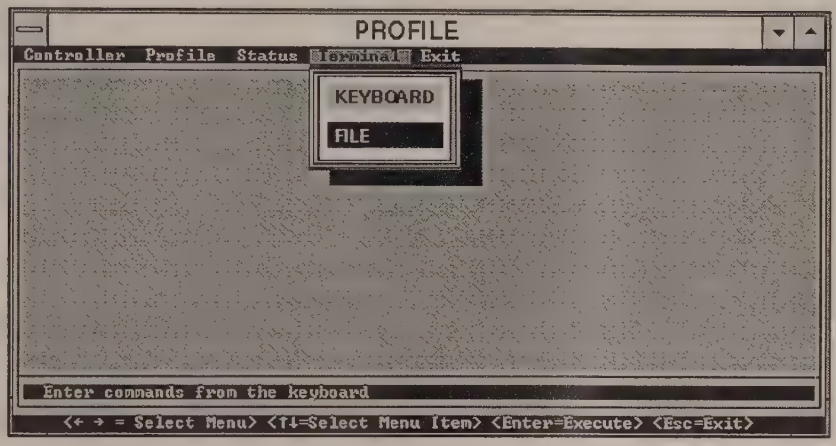
This menu allows you to query the real time position status of the MM3000.

Position Status Screen



In the POSITION STATUS screen, you will be able to sample the real time position count of all installed axes. The displayed position count can either be sampled once or continuously updated.

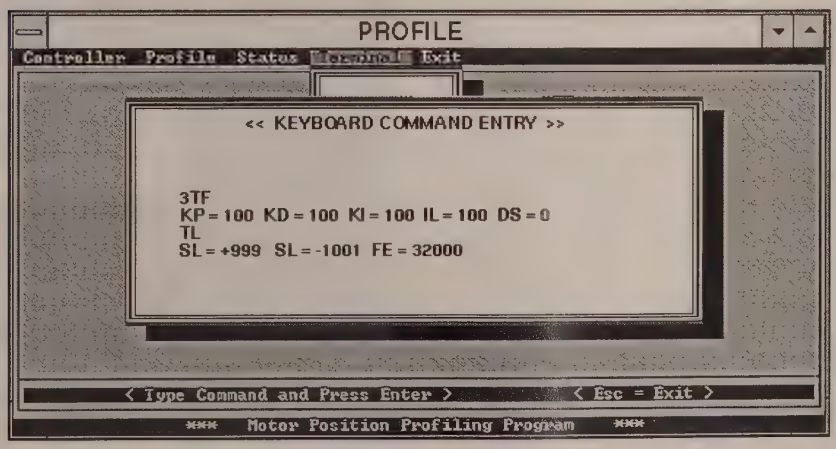
Terminal Menu Screen



The TERMINAL menu will allow you to: (a) interactively send commands to the MM3000 and receive responses and, (b) download files from the host computer to the MM3000.

It is recommended that you familiarize yourself with the controller's command structure and syntax by reviewing the MM3000's User's Manual before selecting KEYBOARD or FILE menu items.

Terminal Keyboard Screen



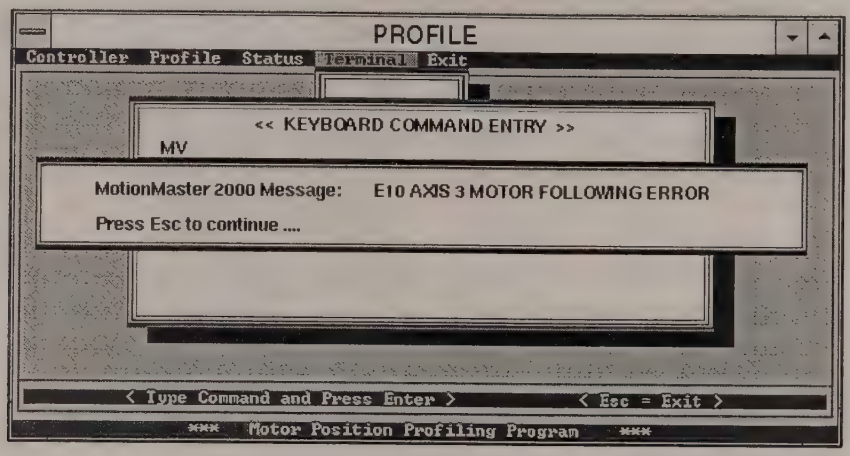
In the KEYBOARD menu, you are allowed to type and send any MM3000 command. The command(s) are automatically transmitted when you press [ENTER].

This utility tests for out-going status query commands (e.g., TP, UP?) and automatically retrieves data from the controller.

NOTE

The user should have a thorough understanding of the MM3000 command structure and syntax before using KEYBOARD command terminal.

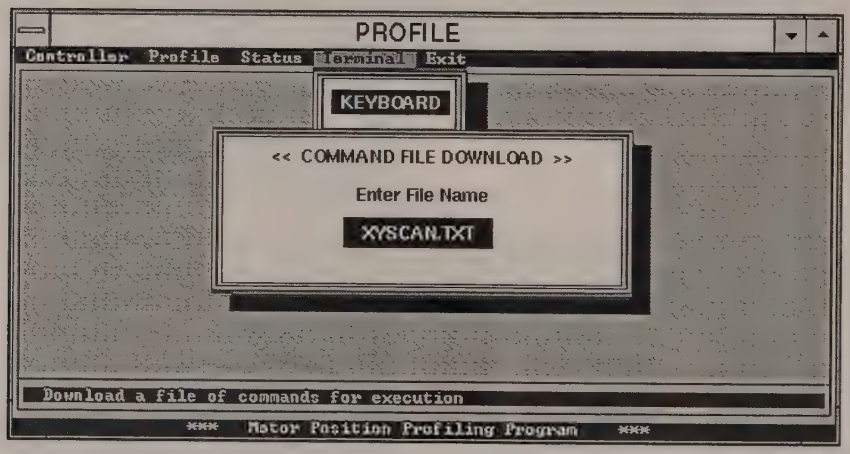
Pop Up Error Message Screen



Whenever the utility detects the occurrence of an MM3000 error, a pop-up error message will appear on the screen.

If this occurs, the keyboard [ESC] escape key must be pressed to continue.

Terminal File Screen

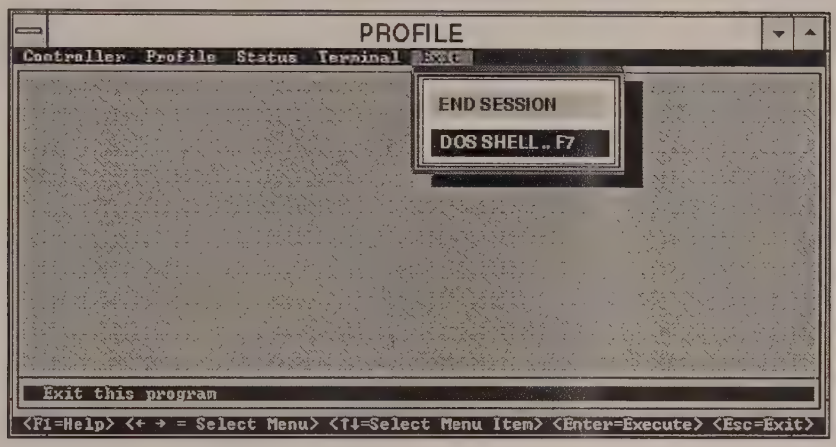


For added convenience, this utility also allows you to download a text file from the host computer to the MM3000 controller.

Files should be located in the same directory as the MM3000.EXE program.

Typically, text files with MM3000 commands or programs are created or edited outside of this utility in any text editor (e.g., MSDOS EDITOR) and then downloaded here.

Exit Menu Screen



To exit this utility select END SESSION from the EXIT menu.

To invoke a DOS shell select DOS SHELL from the EXIT menu or press F7.

Typically, the DOS shell is used to temporarily exit out of this utility in order to edit or create motion programs in text files, re-enter the utility and download the file(s) from the TERMINAL / FILE menu.

Section 4
EZ232 Serial Communications Utility
Version 2.1

4.1 EZ232 Introduction

This DOS based motion profile utility program, EZ232.EXE, is located in the EZ232 directory of the 3.5" distribution diskette.

This program will enable you to quickly establish RS-232C serial communications with the MM3000 controller.

EZ232 is a dedicated full duplex RS-232C terminal emulation program used to communicate with many Newport motion controllers.

EZ232 features COM1 or COM2 port support, up to 19,200 baud, 8KB buffer, selectable software/hardware handshake, full or half duplex communications, file download, DOS shell and help screens.

Use the keyboard arrow (←↑→↓) keys to move across and down the various menus.

4.2 EZ232 Installation and Setup

To install the profile utility program, you need to copy all of the files from the EZ232 directory located in the 3.5" distribution disk to your hard disk (e.g., C: drive).

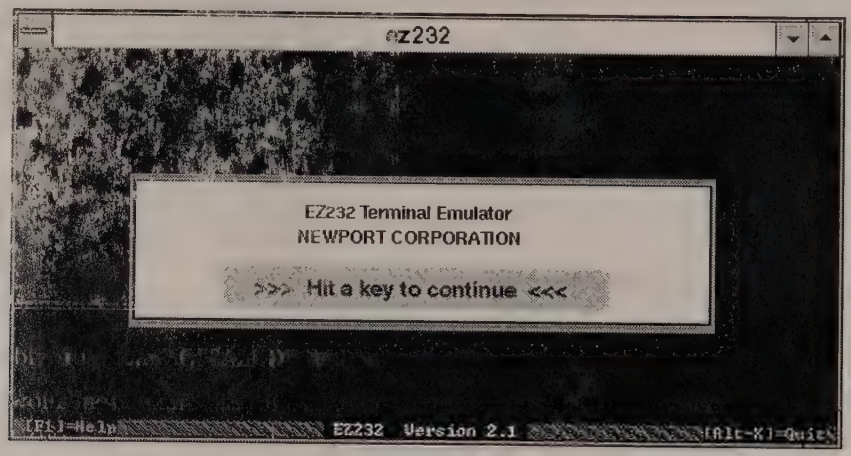
Once the files are installed and the current directory is the one EZ232.EXE was installed into, you will be able to run the utility program by typing "EZ232" at the DOS prompt and pressing the [ENTER] key.

NOTE

Connect RS-232C cable to the MM3000 and power-up the unit before running this utility program.

4.3 EZ232 Program Demonstration

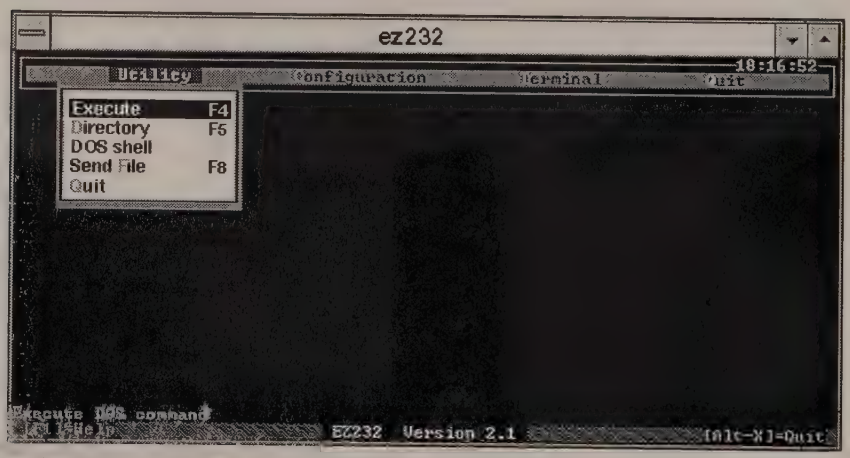
Introductory Screen



When you first begin the MM3000 profile utility program, the introduction screen appears and indicates the software version at the bottom.

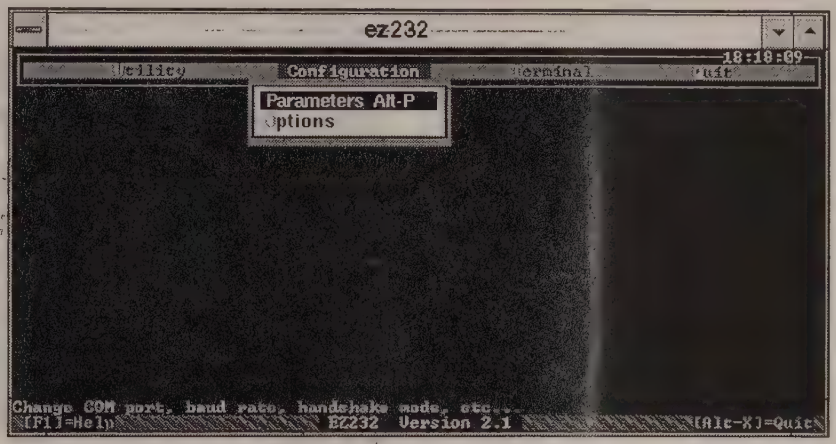
Press any key to proceed beyond the introductory screen.

Utility Screen



The UTILITY menu provides several useful item features. The EXECUTE item is used to execute any DOS command and can also be invoked by pressing the [F4] key. The DIRECTORY item will list all files in the specified directory and can be invoked by pressing the [F5] key. The DOS SHELL temporarily exits EZ232. The SEND FILE item downloads text file to the controller and is invoked by pressing the [F8] key. And QUIT exits EZ232.

Configuration Menu Screen

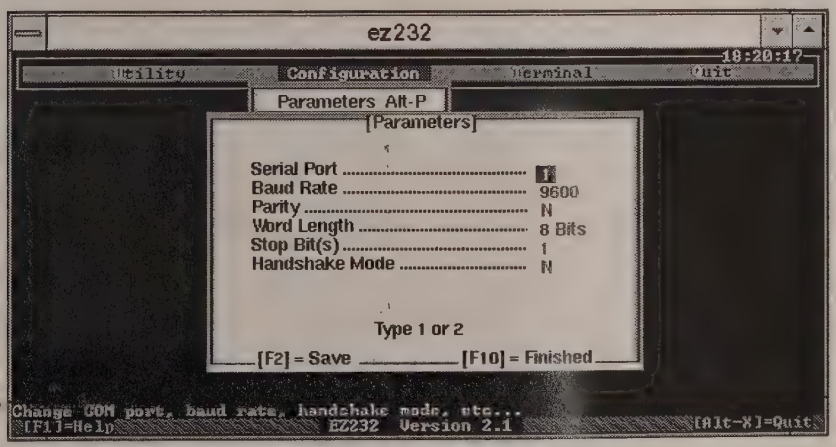


The CONFIGURATION menu provides two items for RS-232C configuration.

The PARAMETERS menu item allows baud rate, word length, stop bits, parity, and handshaking (software or hardware) mode setup. Communication parameters can also be modified at any time using the **Alt-P** key combination.

The OPTIONS menu item permits XON and XOFF character definition, receive/transmit buffer size adjustment, hardware handshaking signal assignment, full or half duplex mode setting, and string terminator definition.

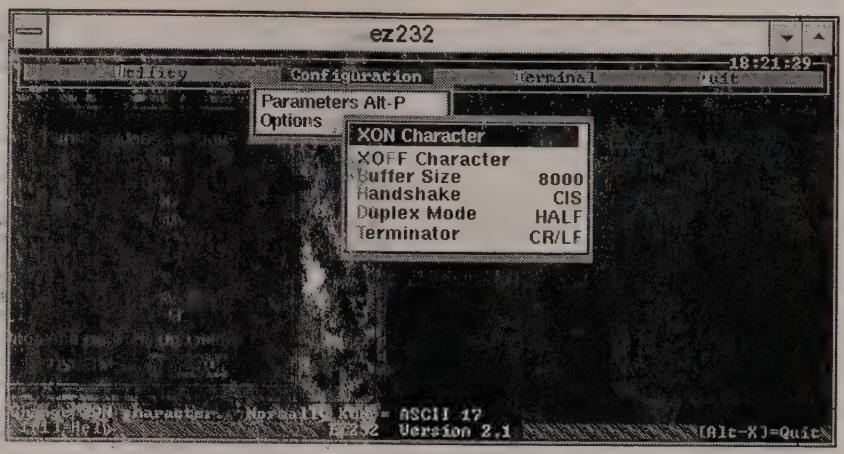
Parameter Setup Screen



The PARAMETER SETUP screen allows COM port, baud rate, parity, word length, stop bits, and handshake mode selection. In addtion, by pressing F2 you can save those settings for use in the following sessions.

Use the keyboard up down arrow (↑↓) keys to move up and down thru various parameter configuration options.

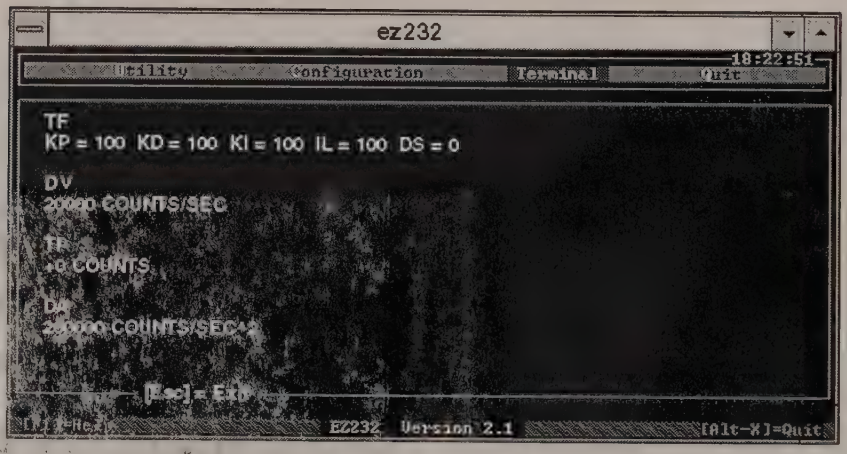
Options Setup Screen



The OPTIONS menu item permit XON and XOFF character definition, receive/transmit buffer size adjustment, hardware handshaking signal assignment, full or half duplex mode setting, and string terminator definition.

Use the keyboard up down arrow (↑↓) keys to move up and down through various configuration options. And use the keyboard left right arrow (←→) keys to change settings.

Terminal Screen

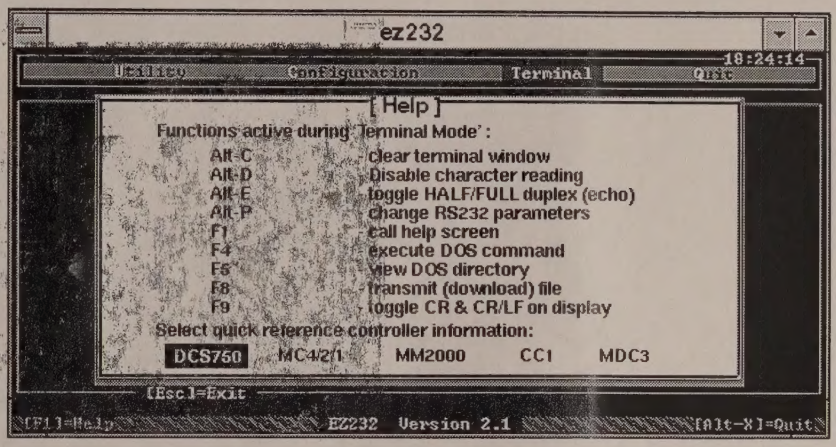


The TERMINAL screen is the most important screen of this utility. Characters typed are instantaneously transmitted to the controller. And because the MM3000 has a full duplex RS-232C interface, the controller will automatically return query responses and error message as they occur.

NOTE

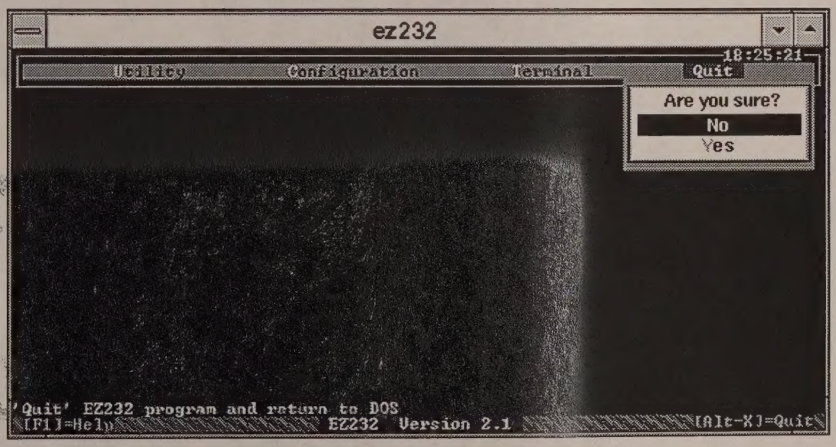
The user should have a thorough understanding of the MM3000 command structure and syntax before entering TERMINAL mode.

Help Screen



This utility also provides a context sensitive pop up help screen when the [F1] key is pressed. For example, if the [F1] key is pressed while in TERMINAL mode, a pop up window reports active "hot keys" (e.g., Alt-C, Alt-P, etc.) and offers multiple controller reference information. Note that for MM3000 applications, the help screen's MM2000 quick reference information can be used for comparison only. Please refer to the MM3000 User's Manual for specific command syntax and structure.

Quit Menu Screen



To quit, or exit this utility, type "Y" for YES in the QUIT menu or press the "Alt-X" key combination at any time throughout the program and type "Y" for YES at the prompt.

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